PATENT SPECIFICATION 725,624

Inventor:—VICTOR HAROLD WENTWORTH.

Date of filing Complete Specification: June 21, 1954.

Application Date: June 22, 1953. No. 17241/53.

Complete Specification Published: March 9, 1955.

Index at Acceptance:— Class 38, A(1 : 6D : 13).

COMPLETE SPECIFICATION.

Improvements in Insulated Electric Wires and Cables.

We, BRITISH INSULATED CALLENDER'S CABLES LIMITED, a British Company, of Norfolk House, Norfolk Street, London, W.C.2, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

In insulated wires and cables in which a core, consisting of a conductor with a covering of plastic material, or a group of such cores, is enclosed in a directly adjacent layer of the same or similar material, the defect arises of liability of damage to the core insulation occurring when the outer layer is being removed, for instance when preparing the end of the wire or cable for the making of a joint or termination. This appears to be due to adhesion, which may be only slight, of the outer layer of plastic material to the inner layer which produces tearing or cracking of the inner layer as the outer layer is drawn away from it. It is found that this damage is more likely to occur in conditions when a cold temperature exists. It has been found to be particularly troublesome with coverings of thermoplastic materials having a basis of plasticised polyvinyl chloride or of a co-polymer of polyvinyl chloride and polyvinyl acetate.

By the present invention this defect is removed or minimised by forming the outer layer (which is usually a sheath) on its inner surface with shallow thin ribs projecting radially inward so that the touching of the two layers is reduced to substantially line contacts. The dimensions of these ribs are not critical: it has been found that a radial depth of 0·020 inch (0·050 centimetre) is satisfactory. The ribs should be close enough together to ensure the location of the core, or cores, within the outer covering.

The outer covering will be applied by extrusion. The invention is applicable to the case of single cores, or to two or more cores, and both to the round form and to the flat type of assembly.

Three forms of electric cable embodying the improved construction are described hereinafter, by way of example, with reference to the accompanying drawings, wherein:—

Figure 1 represents a single core cable;

Figure 2 represents a flat-twin cable;

Fig. 3 another single core cable; and

Figure 4 is a cross sectional view of the cable shown in Figure 1 but to a larger scale.

In the arrangement shown in Figure 1, a stranded conductor 1 is provided with a covering 2 of insulating material comprising polyvinyl chloride compound. Over this is applied an extruded sheath of a similar polyvinyl chloride compound. The inner surface 4 of the sheath is formed with shallow longitudinally extending ribs 12 which are shown upon an increased scale in Figure 4. The ribs are formed by using an appropriately shaped die in the extrusion machine. The ribs 12 are symmetrically arranged about the insulating covering 2, and are of such a shape, as shown, that each makes substantially line contact with the smooth surface of that layer. The radial depth of the ribs, that is the dimension (R—*r*) in Figure 4, is 0·020 inch (0·050 centimetre). By this arrangement the area of contact between the two layers 2 and 3 is minimised so that if adhesion between them should occur the likelihood of damage to the inner layer 2 on stripping away the outer layer 3 is greatly reduced. At the same time the liability to adhesion is reduced because the pressure of the hot compound of the outer layer 3 on the inner layer 2 when the outer is applied by extrusion is eased by the possi-

bility of lateral spread of the inner edges of the ribs 12 due to their thinness and to the spaces between them. The effect is further increased by the cooling provided by the existence of air channels 13 between the two layers.

In Figure 2 two conductors 5 and 6 are provided with insulating coverings 7 and 8 respectively. These are laid side-by-side without being twisted together and an overall sheath 9 is applied by extrusion. In appearance the cable has the form generally known as "flat twin". The inner surface 10 of the sheath 9 is provided with longitudinally extending ribs similar in dimensions to those described with reference to Figures 1 and 4. Figure 3 represents a single core construction similar to that shown in Figures 1 and 4 except that the ribs 11 are closer together and have a smaller radial dimension. The dimensions of the ribs in this case are comparable with those on the milled edge of a coin. Such small dimensions may be used where it is required to comply with a specified minimum sheath thickness.

In all cases the presence of well defined ribs on the inner surface of the sheath is a useful visual proof that the adjustment of the extrusion machine has been such as to avoid undue pressure of the sheath on the underlying layer. This control over extrusion is in itself helpful in avoiding adhesion between the layers.

In addition to the advantages already indicated the invention also provides a saving of material for the same overall dimensions, an improvement in the case of stripping and an increase in flexibility.

What we claim is:—

An electric cable comprising a core, consisting of a conductor having a covering of plastic material, or a group of such cores, enclosed in a directly adjacent outer layer of the same or similar material, in which the inner surface of the outer layer is formed with shallow thin ribs projecting inward so that this layer and the underlying material are in engagement along substantially line contacts.

R. L. CLEAVER,
Agent for the Applicants,
Surrey House, Temple Place,
London, W.C.2.

PROVISIONAL SPECIFICATION.

Improvements in Insulated Electric Wires and Cables.

We, BRITISH INSULATED CALLENDER'S CABLES LIMITED, a British Company, of Norfolk House, Norfolk Street, London, W.C.2, do hereby declare this invention to be described in the following statement:—

In insulated wires and cables in which a core, or each core, consisting of a conductor with a covering of plastic material, is enclosed in a directly adjacent layer of the same or similar material, the defect arises of liability of damage to the core insulation occurring when the outer layer is being removed, for instance when preparing the end of the wire or cable for the making of a joint or termination. This appears to be due to adhesion, which may be only slight, of the outer layer of plastic material to the inner layer which produces tearing or cracking of the inner layer as the outer layer is drawn away from it. It is found that this damage is more likely to occur in conditions when a cold temperature exists. It has been found to be particularly troublesome with coverings of thermoplastic materials having a basis of plasticised polyvinyl chloride or of a co-polymer of polyvinyl chloride and polyvinyl acetate.

By the present invention this defect is removed or minimised by forming the outer layer (which is usually a sheath) on its inner surface with shallow thin ribs projecting radially inward so that the touching of the two layers is reduced to substantially line contacts. The dimensions of these ribs are not critical: it has been found that a radial depth of 20 mils is satisfactory. The ribs should be close enough together to ensure the location of the core, or cores, within the outer covering.

The outer covering will be applied by extrusion. The invention is applicable to the case of single cores and both to the round form and to the flat type of assembly.

By the construction described the area of contact between the two layers is reduced so that if adhesion should occur the likelihood of damage to the inner layer on stripping the outer will be greatly reduced. At the same time the liability to adhesion is reduced because the pressure of the hot material of the outer layer when it is being applied by extrusion on to the core, or cores, is eased by the possibility of lateral spread of the edges of the ribs due to their thinness and to the spaces between them. The effect is further increased by the cooling provided by the existence of air channels between the two layers. It may be advantageous in some cases to increase this effect by employing a forced draught to cause the

passage of increased quantities of air through these channels during the extrusion.

The mere presence of well defined ribs on the inner surface of the outer layer is a useful visual proof that the adjustment of the extrusion machine has been such as to avoid undue pressure of the outer layer on the inner. This control over extrusion is in itself helpful in avoiding adhesion between the layers.

In addition to the advantages already indicated the invention also provides a saving of material for the same overall dimensions, an improvement in the case of stripping and an increase in flexibility.

Dated this 22nd day of June, 1953.

R. L. CLEAVER,
Agent for the Applicants,
Surrey House, Temple Place,
London, W.C.2.

Abingdon: Printed for Her Majesty's Stationery Office, by Burgess & Son (Abingdon), Ltd.—1955.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2,
from which copies may be obtained.

725,624 COMPLETE SPECIFICATION
1 SHEET

FIG. 1.

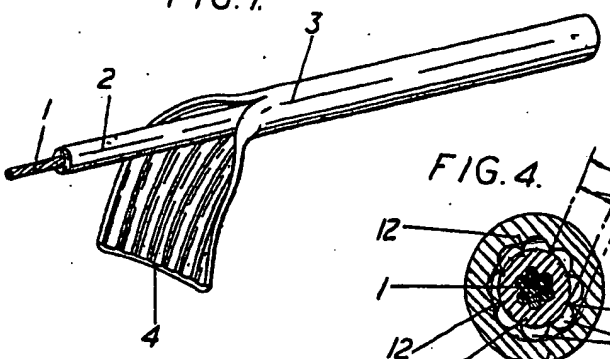

FIG. 4.

Single or multiple conductors

FIG. 2.

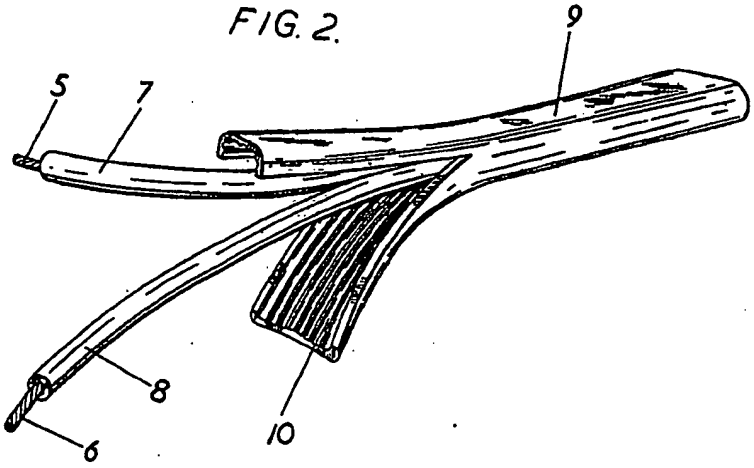

FIG. 3.